

87-e26

Segment No: 07-14-01

WA-14-0110

SOURCES AFFECTING BACTERIA QUALITY  
IN  
OAKLAND BAY  
INTERIM STATUS REPORT

by

Joy P. Michaud

Water Quality Investigations Section  
Washington State Department of Ecology  
Olympia, Washington 98504-6811

March 1987

## INTRODUCTION

Oakland Bay in Mason County has historically been an important part of the shellfish industry in the State of Washington. Shellfish declined in the Bay in the 1930s, apparently due to poor water quality caused by pulp mill discharges. When the discharges were eliminated, healthy shellfish populations were reestablished. The Bay remained closed to commercial harvesting, however, until 1979 when the new Shelton wastewater treatment plant (WTP) began operation. The Department of Social and Health Services (DSHS) then Conditionally Approved the upper end of Oakland Bay for commercial harvest of shellfish. The area again became a major producer, and currently accounts for more than one-third of the State's hardshell clam production.

DSHS conducted an intensive water quality survey of Oakland Bay in late 1986 and early 1987 as part of their routine monitoring program. Survey results indicated there was a bacterial contamination problem in the Bay; consequently, Oakland Bay has been reclassified by DSHS as "Restricted." A "restricted" rating means that shellfish may be harvested, but must be shipped to a certified water for two weeks prior to marketing.

As a result of the reclassification, the Department of Ecology began an investigation into the source(s) of bacteria to the Bay, in an effort to define and correct the problem. The investigation has centered on the city of Shelton's inner harbor area because DSHS data indicated bacteria levels were highest in this area. This report is intended as a review of the steps taken so far in addressing the problem and as an update of Ecology's preliminary findings.

## DESCRIPTION OF THE STUDY AREA

Oakland Bay in Southern Puget Sound is about four miles long and three-quarters of a mile wide at its widest point. It flows into the northern end of Totten Inlet via a long, narrow stretch of water named Hammersley Inlet. Shelton is located at the southern end of the Bay. A number of industries are situated in the inner harbor area. These include Simpson Timber Company, ITT Rayonier Research Laboratory, and Manke Lumber Company. Formerly the Shelton WTP was also located near the inner harbor. The new WTP and discharge are located east of the inner harbor along the south side of the Bay.

Two streams flow into the inner harbor, Goldsborough and Shelton Creeks. Goldsborough Creek is the larger of the two. An estimate of the flow was made on March 10 after a period of light, short-duration rains. The discharge was estimated at 350 cfs. Although Goldsborough Creek flows through the center of Shelton, it is flanked on its southern side by a steep ravine and on its northern side by railroad tracks. Consequently, there is little development close to its shoreline, although stormwater from Shelton and the inner harbor industrial area is discharged to the creek in a number of places. The mouth of Goldsborough Creek is in the mid-section of the inner harbor area.

Shelton Creek originates in springs located northwest of Shelton proper, and had an estimated flow of 16 cfs on March 10, 1987. A large tributary that originates northeast of Shelton accounts for most of the volume (10 cfs on March 10, 1987). Shelton Creek flows through an older residential area in Shelton and is often routed below ground. The water occasionally is used for lawn irrigation. City and industrial stormwater is also discharged to Shelton Creek. These stormwater discharges and the proximity of the older sewer system increase the probability of sewer line leaks or misconnections. Shelton Creek flows into Oakland Bay along the northern edge of the inner harbor.

City stormwater is also discharged to the inner harbor through a 54-inch culvert located south of Goldsborough Creek. During periods of heavy rain, Shelton's sanitary sewer overflows into the stormwater system, causing bacterial contamination problems in the discharge from the culvert. Stormwater from the inner harbor industries is also discharged to the Bay through separate stormwater pipes.

There are five active National Pollutant Discharge Elimination System (NPDES) permits to the Bay--ITT Rayonier Research Laboratory, the Shelton WTP, and three for Simpson Timber Company. ITT Rayonier has a permit to discharge 1.0 MGD of their research facility effluent to the Bay. The discharge site for ITT is near the southwestern corner of the inner harbor. The existing permit for the discharge limits the biochemical oxygen demand (BOD), total suspended solids (TSS), pH, and temperature, as well as the volume of the discharge. The discharge is in compliance with these discharge requirements. The Shelton WTP discharge also needs to meet limits for TSS, BOD, pH, temperature, and flow, in addition to meeting requirements for fecal coliform bacteria and residual chlorine concentrations. The plant is presently not meeting its TSS limits. Simpson Timber Company has three cooling water permits. Simpson is required to monitor flow, temperature, and oil and grease, and are in compliance. All of Simpson's process wastewaters are discharged to the Shelton sanitary sewer.

↳ What about sanitary discharges?

#### CURRENT ACTIONS

The investigation to define the fecal coliform problem is aimed at the three most probable bacteria sources:

1. City stormwater lines that may receive sanitary wastes.
2. Industrial runoff or effluents.
3. Goldsborough and Shelton Creeks.

Several agencies, industries, and the city of Shelton are interested in the outcome of the investigation and are doing their own monitoring in the Oakland Bay area. The information they gather and the actions taken will be integrated into the final report for this study. The following list contains a brief description of the work done to date.

- o The Water Quality Investigations Section (WQIS) of Ecology is conducting an intensive monitoring program in the area and are coordinating with other sampling efforts. An initial reconnaissance survey of point source discharges in the inner harbor was conducted. The results were used to set up a sampling strategy. Potentially important sources of fecal coliform bacteria were chosen based on the volume of discharge and the fecal coliform concentration. These sources have been sampled three times since the initial reconnaissance survey and will continue to be sampled on a bi-weekly basis until the end of the study. To date the data indicate problems with the 54-inch Shelton storm sewer, lower Shelton Creek, and the ITT Rayonier discharge.
- o The Southwest Regional Office (SWRO) of Ecology is working with both ITT Rayonier and the city of Shelton to address their problems.
  - The discharge permit for ITT Rayonier is currently being reviewed and their discharge is being monitored as part of the WQIS work. ITT Rayonier is sampling their effluent concurrently to verify bacteria counts.
  - Shelton's sanitary sewer system is subject to infiltration and inflow (I&I) of ground water and stormwater during wet weather. This causes the sanitary lines to overflow into the storm water system and also results in permit violations for TSS at the wastewater treatment plant. In response, a recommendation has been made to send a notice of violation to the city of Shelton. Correction of the I&I problem should cause an improvement in both the stormwater contamination problem and wastewater treatment plant violations.
  - The SWRO also tested the main sewer pressure line for leaks. Dye was injected into the line to observe whether sewage from the pressure main was seeping into the Bay; no leaks were found.
- o Simpson Timber Company has done extensive monitoring around their facilities to determine whether they may be contributing to the bacterial pollution problem. The monitoring has included sampling Shelton and Goldsborough Creeks and the Bay, as well as the storm drains that enter these waters from their properties and surrounding areas. Simpson is in the process of replacing the three cooling water discharges with one discharge line. Work should be completed by July, 1987.
- o The Mason County Health Department and students from the Extra-curricular Science Project Organization at Shelton High School have been collecting water samples throughout the Oakland Bay area.
- o The city of Shelton has taken an active role in defining their stormwater problems by collecting stormwater samples from different places within their system to determine problem areas. They

are also hiring a consultant to study the infiltration and inflow problems associated with Shelton's collection systems.

#### PRELIMINARY CONCLUSIONS

Although some preliminary conclusions are discussed here, there have been relatively few data collected and analyzed at this time. Furthermore, due to the intermittent rainfall received during this initial part of the study, it is difficult to address the influences of stormwater on the results. Consequently, more information is needed.

Preliminary results indicate that there is no clear, single source of the bacterial contamination. There are several sources that appear to be relatively high and may be important contributors. These are the Shelton stormwater discharge, the ITT Rayonier discharge, and Shelton Creek.

Shelton has been aware of their stormwater problem for a number of years. During periods of heavy rain, the sanitary sewer lines overflow into the stormwater system, causing bacterial contamination of the stormwater. Stormwater samples collected by Shelton and Ecology during drier weather (when sanitary lines had not been overflowing) have had much lower bacteria concentrations, although they were still noteworthy. This indicates that the problem may not be related just to rainfall events. More sampling is necessary to estimate the magnitude and frequency of the high bacteria counts and determine the relationship to rainfall events.

Preliminary data from Shelton Creek indicate that fecal coliform bacteria increase in the stream during rain events. The main source of bacteria appears to be the tributary that drains the northeast section of Shelton and the lower quarter mile of the Creek before it enters the Bay.

The volume of water discharged from ITT has been relatively low (approximately 0.3 to 0.4 MGD), but it is a continuous flow and the fecal coliform concentration has consistently been very high. The experimental "batch" nature of the ITT Rayonier research process seems to result in wide fluctuations in the quality of the discharge. Samples collected have varied from clear to dark tea-colored, and the dominant bacterial species present has varied dramatically.

Other fecal coliform bacteria sources include Goldsborough Creek, overland runoff water from the inner harbor industries, and stormwater discharges from the same industries.

As discussed above, some of the preliminary data indicate that the bacteria sources may be wet-weather related; for example, Shelton Creek and the city of Shelton stormwater discharge. Industrial runoff, if found to be a problem, would also be expected to be a rainfall related source. It is important that the relationship between weather conditions and bacteria concentrations be further evaluated in order to determine their relationship to Bay water quality.

## FUTURE WORK

Ecology (WQIS) will continue monitoring the inner harbor and Shelton and Goldsborough Creeks on a bi-weekly basis through the end of April. This monitoring will be aimed at further defining the magnitude and cause of the known fecal coliform sources as well as determining the possible importance of the stormwater runoff from the inner harbor industrial area. Intensive sampling and a stream walk of lower Shelton Creek and its possible sources will also be conducted.

The city of Shelton, ITT Rayonier, and Ecology will continue developing a work plan for their discharge problems.

A second status report will be published in early May and will include sampling results with a more detailed discussion.